35 centavos a copy
₱3.00 a year
(ten numbers)

The Philippine Agriculturist

Foreign subscription
$2.00 a year
(U. S. Currency)

Entered at the Post-Office at Los Baños, Laguna, as second-class mail-matter

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VOL. VII OCTOBER, 1918 No. 3

EDITORIAL

When the alumni of the University of the Philippines were given a chance to elect their representative on the Board of Regents and they chose Assistant Professor Bienvenido María Gonzalez for the new place, they certainly made their selection with the consciousness of having found a man who is eminently qualified to fill the position. It does not seem proper to dwell on predictions of what Professor Gonzalez can and will do in connection with this important capacity; but on the basis of his past record of accomplishment, both private and official, we feel fully justified in giving unqualified assurance that Professor Gonzalez can be depended upon to act properly and effectively for the best interests of our Alma Mater.

Having received his early education in San Juan de Letran and then subsequently finishing his studies in the Philippine public schools, in the University of the Philippines, and in one of the best American universities, Professor Gonzalez possesses the happy combination of Spanish and American ideals, the mastery of which is so essential to anyone dealing with Philippine affairs. His extensive travels in the United States and in Canada, as well as his visits to many different places in the Philippine Islands, furnish him with ability to reason out matters fairly and broad-mindedly. Since early age, he has identified himself conspicuously with many important public activities, of which a few can be cited here. He has been appointed and reappointed business manager of THE PHILIPPINE AGRICULTURIST, and, in both cases, he put the paper on a very sound financial footing. The College Co-operative Co., the first of its kind in the university,

and a great convenience to students and faculty members, with its yearly dividends unheard of in local commercial enterprises conducted on such a limited scale, owes its existence principally to his organizing ability. As an assistant professor of animal husbandry, he has made his department a well organized, and, under present conditions, thoroughly efficient department; and through his well directed and systematic efforts, he has begun to lay the foundation of real, scientific animal husbandry in the College of Agriculture.

Our remarks will not be complete without quoting and reaffirming a previous enumeration of some of Professor Gonzalez's outstanding traits, from a pre-election circular distributed among the graduates of the university: "... we know him to be a man who, after having determined in his own mind, by careful weighing of the factors, the desirability or the undesirability of a given project, does not fear to go toward getting it or defeating it with well balanced and herculean energy. We know that he will do all in his power to further the interests of the alumni and those who are to be alumni. We know that he will weigh both sides of the question and choose the right one, and that he will let no exterior or ulterior motive swerve him. We know that he will say what he thinks without camouflage. He has demonstrated these qualities time and again in his official and private acts, both as a student and as an alumnus. .....A man possessed of a pleasing personality and at the same time commanding the respect of those that know him, a convincing speaker, holder of a series of record successes in whatever business affair he handled for the good of the university, and a man deeply interested in the welfare of his associates —these form an unusual combination of characters given only to born leaders of men."

An Inhibitor in Rice

By Nemesio B. Mendiola[1]

In 1914, Jacobson[2] reported two pink kernels, which he designated as *a* and *b*, from a head of a white variety of rice. Upon inbreeding, *a* produced in the first generation 100 per cent white kernels, while in the second, 6 per cent red kernels and presumably, although it was not stated, 94 per cent white were obtained, while *b* gave in the first generation 100 per cent red and in the second, 24 per cent white and 76 per cent red.

As Jacobson pointed out, *b* behaved as a simple monohybrid. Evidently, in this case, red is dominant over white and the genotypic ratio of 1 red to 2 red-white to 1 white was obtained, but since red is dominant over white the ratio became phenotypically 3 red: 1 white (76% red: 24% white).

He did not find the case with kernel *a* as simple as that with *b*. In this case a kernel having the same color as *b* at the beginning produced only white kernels instead of red in the first generation, and in the second, produced 6 per cent red. To this phenomenon he offered no explanation but invited comment thereon.

It is the purpose of the writer to offer in this article two possible explanations of the behavior of kernel *a*.

Since kernels *a* and *b* were found in the same head and only the colors red and white are concerned in both cases, it is safe to say that *a*, like *b*, was a monohybrid. Its failure to produce red in the first generation and to exhibit a Mendelian monohybrid ratio in the second might be due to the effect of environment. Genetic literature abounds in evidences of effects of environment upon the characters of an individual plant or animal which are even more striking than the case in question. It would be easy to reconcile ourselves to this idea if we were to bear in mind that from the standpoint of the entire individual, "environment", in its general use, means all that lies outside the individual. Although Jacobson did not state that he planted the two kernels in two widely separated places, it is reasonable to assume that this was actually done to prevent crossing. In so doing, the two kernels which we assume to belong to the same genotype were placed under two different sets of conditions of environment with the result that the plants produced behaved differently. This was, likewise, the case with their offspring.

Another explanation is the probable presence of an "inhibitor" or an inhibitory determiner in the original kernel. That the entire failure of the dominance of red over white in the first generation was not due to the absence of the former can be seen easily from the fact that in the second generation, red reappeared. The partial dominance of red in the second generation was due to the presence of an inhibitory determiner which prevented red from manifesting its total potency.

As to which of the two hypotheses suggested above will prove valid can be tested only by continued inbreeding of the second generation offspring of kernel *a*.

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[1] Instructor in Agronomy, College of Agriculture.

[2] Jacobson, H. O., Xenia (?) in Rice. The Philippine Agricultural Review (1914) 7: 361.

Hybridization of Eggplants[1]

By Arsenio M. Bayla

INTRODUCTION

OBJECT OF THE WORK

At present the native eggplants in the Philippines are believed by many people to be superior in both quality and flavor to the foreign varieties. They are called the "boiling variety" while the foreign is called the "frying variety." This extra quality is due probably to the fact that the native eggplants are more firm in texture and possess a sweeter taste than the foreign varieties. However, in the size of fruit and uniformity in color, the native eggplants are usually inferior to the foreign varieties. The color ranges from a dark purple to a whitish green. Purple is the recognized color for eggplants and any deviation from this is not popular. Besides these faults, the amount of production per given unit of area is not so great with the native varieties as it is with some of the leading foreign varieties.

There are at least three methods by which we can establish an improved variety. The first one is by selection, the second is the combination of selection and hybridization, and the third is by vegetative propagation. Vegetative propagation has been carried on extensively with fruit trees, and, to some extent, with certain vegetables, but it has been used only to a small extent with eggplants.

In the present study the writer has aimed to show the possibility of improving the native elongated eggplants by crossing them with the New York Improved variety. In this work the selection method was not adopted because this would necessitate the growing of the plants on a large scale in order to have a sufficiently large field from which to select. As these experiments were carried on for a period of less than two years, the entire work was confined to cross pollination and a study of the first- and second-generation hybrids.

PREVIOUS WORK ON EGGPLANT HYBRIDIZATION

So far as the writer knows, no work on the hybridization of eggplants has been carried on in the Philippines previous to these experiments.

Considerable work has been done on eggplant hybridization at the New Jersey Agricultural College Experiment Station[2-4]. Some of the crosses were made with the following varieties: "Ivory" upon "Black Beauty"; "Black Beauty" upon "Round Purple"; "Dwarf Purple" upon "Scarlet Chinese"; "Long White" upon "Dwarf Purple"; "Chemmelon" upon "Ivory"; and "Long White" upon "New York Improved".

"Ivory" upon "Black Beauty". In the first generation the offspring grew taller and were more productive than the parents. The hybrid resembled the female parent (Black Beauty) in form, color, and in size. The number of fruits per plant was less than that produced by the male parent, while the total product in weight was greater than that of either parent.

"Black Beauty" upon "Round Purple". The offspring was intermediate in height between the two parents. The number of fruits per plant and the total product in weight excelled both parents. The general form was that of a bell or a pear, different entirely from either

[1] Thesis presented for graduation from the College of Agriculture, No. 97.

[2] New Jersey State Agricultural Experiment Station. Thirty-first Annual Report (1910): 226-239.

[3] New Jersey State Agricultural Experiment Station. Thirty-second Annual Report (1911): 391-394.

[4] Novelties in Vegetable Fruits; General Trial for 1908. New Jersey Agricultural Experiment Station Bull. 209.

parent. The color was pale purple or pink and resembled the male parent "Round Purple".

"Dwarf Purple" upon "Scarlet Chinese". The offspring gained much in height. The average of fruit, as well as weight of the product, was greater than that of either of the parents.

"Long White" upon "Dwarf Purple". In the second generation 64 plants were grown for a detailed study of plant, flower, and fruit characters. The plants were very slow in starting due to the unfavorable weather conditions, and very few of them reached their full development.

The results obtained are tabulated below:

TABLE I

Purplish-stemmed plants	52
Green-stemmed plants	12
Purplish-fruited plants	36
Green-fruited plants	24
Ivory-fruited plants	4
Spiny plants	64
Plants with pear-shaped fruits	41
Plants with oval fruits	11
Plants with fruit surface white under calyx	38
Plants with fruit surface greenish under calyx	26

The three dominant characters, (1) purple color of the stem, (2) purple color and (3) pear form of the fruit were inherited from the Dwarf Purple (female). The hybrid plant was spiny, like both parents.

VARIETIES USED IN THE PRESENT EXPERIMENTS

The varieties used in the present work were the purplish native elongated eggplants and the New York Improved variety. The seeds of the New York Improved were from the best selected fruits raised by the Agronomy IV class, and the native elongated seeds were purchased from one of the growers in the barrio of San Antonio, Los Baños, Laguna. The New York Improved variety had been cultivated at the college for two generations.

METHODS USED

Each parent was planted in the college acclimatization plots. The area of the plot was one two-hundredths of a hectare. This plot was previously planted with forage crops. The dates of planting and flowering are enumerated below:

TABLE II

Name of parents	*Date of planting*	*Date of flowering*
New York Improved	November 13, 1916	December 16, 1916
Native Elongated	November 13, 1916	December 20, 1916

The cross made of the parents was reciprocal and cross pollination was accomplished thus: The anthers of the unopened flowers were removed and then the emasculated flowers were carefully bagged for the purpose of protecting the stigmas from foreign pollen. Three days after emasculation the bags were removed and the pollen was applied to the stigmas. The flower was then rebagged and left until the fruit appeared. The descriptions of parents, as well as of the resulting hybrids, are summarized in Table III.

TABLE III

CHARACTER OF THE PARENTS AND HYBRIDS

	Native Long	*New York Improved*	*Native Long* × *New York Improved*	*New York Improved* × *Native Long*
			F*1*	F*1*
Height of plant	75-175 cm.	70 cm.	60-70 cm.	52.5—60 cm.
Stems	Somewhat straight, rounded	cylindrical straight		
Diameter	1–1.5 cm.	1–1.5 cm.	1.75 cm.	1.7 cm. above ground
Color	very light violet green	Light yellowish green	Light greenish violet	dark yellowish green
Leaves:				
Average area	80 sq. cm.	150 sq. cm.	101.46 sq. cm.	99.75 sq. cm.
Number of lobes	5–7	6–7	6–7	5
Color of petiole and main veins	very light-violet	dark green	light purplish–green	light violet-green
Flowers:	small	large		
Number of clusters	3-4, usually 3	3–4	3–4	4
Corolla lobes	4–5	6	6	6–7
Color	deep violet	light violet	light heliotrope	
Spread:				
Length	3–3.5 cm.	4–5 cm.	5 cm.	5.6 cm.
Diameter	2–3 mm.			
Anthers:		6–7	6	6–7
Length		8–9 mm.	1–1.4 cm.	1.7 cm.
Diameter		1–2 mm.	2 mm.	2 mm.
Ovary:				
Length	6 mm.	7 mm.	6 mm.	9 mm.
Diameter	3–4 mm.	8–9 mm.	5 mm.	6 mm.
Fruits:				
Shape	elongated, slightly pointed	globular	semi-long pear shaped	long and somewhat pear shaped
Color	from whitish-purple to light purple	light to dark purple	dark greenish purple	light greenish-purple
Length	12–20.5 cm.		16 cm.	17.4 cm.
Diameter	3–4 cm.		8 cm.	8.1 cm.

Tables IV and V are descriptions of hybrids of the first generation.

TABLE IV

NATIVE LONG × NEW YORK IMPROVED

Fruit No.	*Weight gm.*	*Length cm.*	*Diameter cm.*	*Length peduncle*	*Diameter ped.*	*Length of calyx*	*Shape*	*Color*	*Color beneath calyx*	*No. of seeds*
1	379	14.3	8.1	8.9	1.3	3.9	SLP*	DBP*	LG*	201
2	318	15.5	8.6	8.9	1.2	2.9	LP	LPG	VLP	896
3	374	16.2	8.6	8.2	1.3	3.2	LP	LPG	LG	1002
4	375	16.6	8.8	8.9	1.2	3.2	LP	LPG	LP	2341
5	293	15.4	8.4	7.5	1.1	3.3	SLP	DP	DPG	1211
6	386	16.2	7.9	7.3	1	3.4	LP	DPG	LG	945
7	372	16.3	8.3	7.6	1.2	3.2	SLP	DP	LG	1012
8	306	16.9	7.9	7.9	1.3	3.5	P	LP	DPG	1112
9	325	15.8	7.5	7.2	1.2	3	Oval	DPG	LGP	1211
10	298	14.2	8.3	7.1	1.2	3.2	SP	LP	LG	964
Ave.	342.6	15.7	8.2	7.9	1.2	3.2	LP	LGP	LG	1089.5

* Legend for abbreviations used:
V, very; D, dark; G, green; L, light or long; S, slightly; P, purple or pear; W, white.

TABLE V

NEW YORK IMPROVED × NATIVE LONG

Fruit No.	*Weight gm.*	*Diameter in cm.*	*Length in cm.*	*Length in cm.*	*Length ped.*	*Length of calyx*	*Shape*	*Color*	*Color beneath calyx*	*No. of seeds*
1	418	8.5	21.5	7.9	1.5	5.4	SLP	DP	LP	984
2	395	8.4	19.5	7.8	1.4	5.2	P	DP	LGP	1043
3	320	7.9	17.9	7.5	1.9	5.1	LP	DP	LWP	1131
4	343	8.8	18.9	7.6	1.4	4.9	LP	DP	LP	1316
5	343	7.9	18.4	8.2	1.5	5.3	LP	DGP	LPG	1300
6	393	7.8	17.3	8.0	1.3	5.0	LP	LP	LP	894
7	323	8.1	18.6	7.6	1.5	4.8	SLP	DPG	LG	20
8	273	8.7	16.4	7.9	1.4	4.9	Oval	P	P	143
9	273	7.9	14.5	8.4	1.3	5.6	SLP	LGP	LP	1121
10	270	7.9	14.3	8	1.4	5.	LP	DPG	P	1212
Ave.	335.1	8.1	17.8	7.9	1.3	5.1	SLP	DGP	LP	916.4

Comparing the relative amount of influence which each parent had upon the offspring, it will be seen that the New York Improved variety has more dominant characters than the native long. The difference is quite evident on the average characters of the best ten selected hybrid fruits produced from each cross; this is shown clearly in the above tables.

The following table shows the difference between both parents and the two hybrids, based on the averages of ten average fruits:

TABLE VI

AVERAGE CHARACTERS

Variety Name	*Wt. in gm.*	*Length in cm.*	*Diameter in cm.*	*Length ped.*	*Diam. ped*	*Length of calyx*	*Shape*	*Color*	*Color beneath calyx*	*No. of seeds*
N. Y. Imp.....	351	12.3	10.4	8.4	1.6	4.2	SG	LP	VLP	2846.2
Na. × N. Y. I.....	340.8	15.2	8.7	7.9	1.3	3.2	LP	LPG	LG	1089.5
N. Y. I. × Na. L..	335.1	17.4	8.1	8	1.5	5.1	SLP	DPG	LP	916.4
Native Long.....	98	19.2	3.3	8.4	.8	4.1	Long	LGP	VLGP	3099.5

In the above table, the average number of fruits per plant and the total produce of one plant were not included because the plants were badly damaged by a bacterial disease, *Bacillus solanacearum* Erw. F. Smith.

CONCLUSIONS FROM FIRST-GENERATION HYBRID RESULTS

1. The first-generation hybrid plants were very much more vigorous, strong, and healthy than either parent. Results similar to these were obtained by Bailey from his F_1 and F_2 generation work on eggplant hybridization.

2. Comparing the New York Improved variety with the hybrid (Native × New York Improved), it will be noticed that the hybrid gained in the length of the fruit over the female parent. The weight diameter, and shape, of the hybrid fruits leaned more toward the female parent (New York Improved) while the color of the fruits and the portion beneath the calyx resembled more the male parent.

3. Again, comparing the New York Improved with the hybrid (New York Improved × Native), it will be seen that the hybrid closely approached the parent in the weight, diameter of fruit, diameter of peduncle, and length of calyx of the fruits.

4. Examining the comparative difference between the Native Long and the hybrids (New York Improved × Native Long) it is evident that the hybrid gained very much ovef the parent in weight and diameter of fruit, diameter of peduncle and length of calyx fruits. The shape and color of the fruits assumed an intermediate position between the two parents.

5. Comparing the native long with the hybrid (Native × New York Improved), it will be noticed again that the hybrid gained very much in the weight and diameter of the fruits. The color resembled that of the male parent but the shape was intermediate between those of the two parents.

6. Comparing now the average characters of the parents and the hybrids it is very evident that the hybrids gained very much in the weight, lengths and diameter of fruits, and diameter of peduncle of the fruits.

7. In general the hybrid had fewer seeds than either parent.

The conclusions stated above based on quantitative averages are nothing more than indications of what results may be obtained, since it is not known whether the differences between any two of these averages is significant or not.

RESULTS WITH SECOND-GENERATION HYBRID

Forty hybrid plants from each cross were grown for the second generation crops. The seeds were from the best selected F_1 fruits and were given the same treatment as the previous crop, except that they were planted in newly prepared virgin soil. The F_1 seeds were planted in an isolated place to minimize the danger of infection by the bacterial disease which ravaged the previous crops; but in spite of this precaution the disease attacked the plants almost as severely as the first planting and this, together with unfavorable weather conditions, made the crop practically a failure. In general, the second crop fell below that of the first, both in size of fruits and productiveness. It was not possible to secure sufficient fruits for a detailed study.

For a study of the second plantings from the F_1 seeds, the best fruits from each cross was chosen, the data of which is found below. Because the bacterial disease almost destroyed the crop, it was possible to obtain the few data which are shown in the following tables:

TABLE VII
FIRST GENERATION AVERAGE

Variety Name	*Wt. in gm.*	*Length in cm.*	*Diam. in cm.*	*Length peduncle*	*Diam. ped.*	*Lenth calyx*	*Shape*	*Color*	*Color beneath calyx*	*No. of seeds*
Native Long × New York Improved..	340.8	15.2	8.7	7.9	1.3	3.2	LP	LPG	LG	1089.5
New York Improved × Native Long	335.1	17.4	8.1	8	1.5	5.1	SLP	DPG	LP	916.4

TABLE VIII

SECOND GENERATION AVERAGE

Variety Name	*Wt. in gm.*	*Length in cm.*	*Diam. in cm.*	*Length pedun-cle*	*Diam. ped.*	*Length calyx*	*Shape*	*Color*	*Color beneath calyx*	*No. of seeds*
Native Long × New York Improved..	402	21.6	9.4	8.5	1.4	5.4	BLP	LGPY	LG	1141
New York Improved × Native Long	362	10.2	10.4	8.3	1.6	5.2	BP	LP	LPG	1310

SUMMARY OF THE SECOND-GENERATION HYBRID RESULTS

The following conclusions were based on a study of only a few fruits and should not be taken as very definite conclusions.

1. Comparing the F_2 hybrid of New York Improved × Native Long with the F_1 hybrid New York Improved × Native Long, it will be noticed that the F_2 gained in the length, diameter, and weight of the fruit. Again, comparing with the parent New York Improved it is clear also that the F_2 hybrid New York Improved × Native Long gained in the weight, length, and diameter, and length of the calyx.

2. Comparing the New York Improved × Native Long with the F_1 Native Long × New York Improved it is clear that the F_2 hybrid increased in weight, length, and diameter of fruit, and length of the calyx.

3. Examining the F_2 Native Long × New York Improved and the F_1 Native Long × New York Improved, it is plain that the fruit of the F_2 generation gained in length, diameter, and in the length and diameter of the peduncle and calyx. Comparing with the Native Long parent, it is evident that the F_2 Native Long × New York Improved was superior in the weight, diameter of fruit, diameter of peduncle, and length of the calyx.

4. The color of the F_2 hybrid of New York Improved × Native Long deviated from that of the F_1 hybrid and more nearly approached that of the New York Improved; but the F_2 hybrid of the Native Long × New York Improved was entirely different from the F_1 hybrids and the parent in that the hybrid of Native Long × New York Improved possessed a light-greenish purple color tinged with yellow.

CONCLUSIONS AND RECOMMENDATIONS

1. These experiments have demonstrated that it is possible to cross the native and foreign eggplants and that the F_1 hybrids are more vigorous and prolific than either plant.

2. The New York Improved seems to possess most of the dominant characters.

3. The F_1 plants seem to be quite resistant to the bacterial disease, but those of the F_2 generation were no more resistant than were the parents.

4. It is believed that individual selection work with this hybrid eggplant will develop a strain superior to either of the two parents. This should be done on a rather large scale, paying special attention to prolificacy, hardiness and earliness of maturity.

ACKNOWLEDGMENT

The writer expresses his great obligation to Professor Joseph A. Cocannouer under whose direction this work was undertaken, for his valuable suggestions and criticisms throughout the course of the entire work.

Experiments on Hog Feeding with and without Pasture[1]

By Pantaleon Bautista

INTRODUCTION

The farmers in these Islands can produce pork cheaper than the farmers in the United States, because no expensive housing is necessary, pasture can be had almost the year round, and protein concentrates, as well as carbohydrates, can be raised on our farms much cheaper than in the United States. What a Filipino hog raiser should do is to select the breed of our hogs adapted to his conditions and to select the best hog-feeds. Breed and feed, being two of the three important factors—breed, feed and disease—which determine the success of a hog raiser, they require careful attention. This work deals with one of these factors—the feeding of hogs for pork production.

PREVIOUS WORK ON THE SUBJECT

The experiment stations of the United States agree in recognizing pastures as indispensable to the cheap production of pork,[2] and that corn is the basis of all rations for fattening hogs.[3] In the Arkansas Station it was proved that 100 pounds of rice polish equal 133 pounds of corn, and 100 pounds of rice bran equaled 112 pounds of corn.[4] At the Missouri Experiment Station the following results were obtained with pastures.[5]

TABLE I

RESULTS WITH SORGHUM FORAGE

Year	*Number days pastured*	*Number hogs per acre*	*Pounds gain per acre*	*Pounds grain per acre*	*Pounds gain accredited forage*
1909....	105	14	1412	6584	236.3
1912....	68	16	869.3	3112	313.7
Average.	86.5	15	1140.6	4848	275.0
RESULTS WITH COWPEA FORAGE					
1908....	33	14	756	2200	363.1
1909....	32	12	502	1270	275.2
1910....	42	12	176	784	36.5
1911....	25	13.5	171.2	504	81.2
1912....	22	12	54.6	264.	7.6
Average.	32.8	12.7	331.9	1004.5	212.7

Durham,[6] working in this college in 1912 and 1913, obtained the following results in a number of feeding trials using corn as the sole grain ration and cowpeas principally as pasture.

TABLE II

RECALCULATION OF DURHAM'S RESULTS

Pasture	*No. of days pastured*	*Area of Lot hectares*	*No. of pigs*	*Ave. Wt. of pigs lb.*	*Total gain lb.*	*Counted per lb. gain*	*Corn equiv. per lb. gain attributed pasture*	*Value of 1 hectare pasture in corn equiv. lbs.*	*Pounds pork per ha. pasture*
Mungo and Cowpea.	16	0.0702	12	32.5	45.4	2.13	3.46	2244.2	400.7
Cowpea.....	18	0.081	12	38.1	93.2	1.97	3.62	4166.5	745.3
"	19	0.08	10	72.9	170.6	2.26	3.33	5685.0	1271.6
"	10	0.081	10	61.1	117.0	1.88	3.72	5365.6	959.8
"	16	0.076	11	47.0	134.6	2.33	3.26	5152.1	1029.0

NOTE: 5.59 lb. of corn is taken as equivalent to 1 lb. of grain. Wisc. Rpt. 1907.

THE PRESENT EXPERIMENTS

The following experiments were conducted along two distinct lines of feeding, namely: Part I, the growing and fattening of pigs on forage crops; and Part II, the growing and fattening of pigs in a dry lot, that is, a lot without any growing crop.

[1] Thesis presented for graduation from College of Agriculture, No. 95.

[2] Farmers' Bull. 100 (1899): 19-20.

[3] Purdue University Agr. Exp. Sta. Bull. 126 (1908) 14: 143.

[4] Henry and Morrison, Feeds and Feeding (1916): 607.

[5] Missouri Exp. Sta. Bull. 110 (1913): 193 and 194. The factor 5.6 pounds grain as equivalent to 1 pound gain was used in these computations.

[6] The Phil. Agr. and For., (1915) 4: 173.

PART I

THE GROWING AND FATTENING OF PIGS ON FORAGE CROPS

In the following experiments it will be noticed that one dry lot was always used in comparison with one or two lots on pasture. The dry lot in this case was used so as to have a check to the lot on pasture.

The dry lot that was used was one in which the pigs of the college were usually confined, so that this lot was already bare of green leaves and grasses. The area of this lot was 639.40 sq. m.; the area of the pastures will be found in the description of each pasture.

PLAN OF FEEDING

Each lot was provided with barrels where at the beginning of each week a certain weight of feeds was put. From these stores the daily feed was taken. If the feeds were to be mixed, the mixing was done at the time of putting stores in the barrel. At the end of the week the feeds remaining were weighed and the weight subtracted from the original weight.

MATERIALS USED

The corn that was used in this experiment was native yellow flint from the fields of the college; the rice bran, bought from a local dealer, was from Bulacan rice, more or less free from hull, and might be considered as second-class rice bran. The pastures used were planted to cowpea (*Vigna sinensis*, var. New Era) and sorghum, *Andropogon Sorghum*, varieties Red Kaffir and Milo). The pigs were Duroc Jersey—and Berkshire-Jalajala grades from the herd of the college. They were from four litters and their descriptions will be given later.

PRICES OF FEEDS

The price of corn was based on the report of the Director of Agriculture for 1914. According to this report, the average price per cavan of shelled corn in Laguna was ₱2.71, and the weight of one cavan was 58.5 kilograms.[1] For the sake of uniformity in the results of these experiments, the price of rice bran was based on one price only, ₱1.25 per cavan, and the weight of one cavan as 26 kilos.

EXPERIMENT No. 1

OBJECT OF THE EXPERIMENT

The object of this experiment was to compare the value as feed for hogs of cowpea-sorghum planted broadcast for pasture, with the same kind of pasture plus a half ration of a mixture of 3 parts rice bran and 7 parts ground corn, and with a full ration of the mixture of 3 parts of rice bran and 7 parts of ground corn without pasture. By a full ration is meant all the pigs would eat up clean twice a day.

PLAN OF THE EXPERIMENT

On May 15, 1917, twelve nearly uniform pigs were selected from the herd of the college; four of these were born on November 3 and eight were born on January 5, 1917. These pigs were weighed for four successive days, the average weight found of each, and then they were divided into three uniform lots of four pigs each.

Lot No. 1, having 67.8 kilos as the total of the average weight, was turned on a dry lot, where the animals had access to plenty of shade and water, but no green feed. This lot was given a full feed of the grain mixture.

Lot No. 2, having 68.0 kilos as the total of the average weight, was allowed to run on the cowpea-sorghum pasture, and was given half the amount of grain Lot No. 1 could consume in one day. The animals had access to shade and water.

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[1] Bu. of Agr. Statistics for the Phil. Is., 1914.

Lot No. 3, having 68.0 kilos, the total of the average weight, was allowed to run on the cowpea-sorghum pasture, where the animals were given water and shade, but no concentrate.

These three lots were weighed weekly and after two weeks they were weighed for three successive days and the average computed.

The concentrated feed that was given to Lot No. 1 and Lot No. 2 was composed of 7 parts, by weight, of ground corn and 3 parts, by weight, of rice bran. The ground corn and rice bran were mixed dry in the given proportions. Immediately before feeding, the amount of feed to be given to each lot was weighed out and mixed into a thick slop, enough water being used to moisten all the feed so that it would pour out of the bucket without any difficulty. It was then fed in a trough the cross section of which is in the form of a letter V. The trough was made of two boards nailed together with small boards closing the ends.

The time for feeding concentrate was twice daily—morning and afternoon.

All the pigs in the three lots remained in a thrifty condition throughout the experiment.

In all costs reported, (1) labor of feeding and management, (2) risk and interest on the hog and (3) depreciation and interest on the equipment, are assumed to be offset by (*a*) manure produced and (*b*) the uniform distribution of this manure without leaching loss.[1]

DESCRIPTION OF THE PASTURES

The two lots that were used in this experiment were planted together as one whole plot on March 15, 1917. The preparation of the soil and planting of these two lots took one man one day and a half, working eight hours a day, or a total of twelve hours. At eighty centavos a day for the laborer and ₱0.40 for the bullock, the expense for plowing and planting was ₱1.80. The pasture consisted of cowpeas and sorghum planted broadcast. The area of each lot was 986 square meters, approximately one-tenth of a hectare. When the pigs were turned into pasture, which was May 19, 1917, the pasture was in full fruit. The pigs ate first the pods, then the young leaves of cowpea and sorghum, and when no more young leaves remained the pigs began to hog down the sorghum. They cut down the stalk of sorghum and then ate the seeds and younger leaves.

On the morning of June 4, after weighing the pigs, this experiment was closed, and the four pigs in Lot 3 were set free. The cowpeas in this lot were all eaten, and all sorghum plants were torn down and the fruits eaten. Aside from the stalks of sorghum and the branches of cowpeas, the lot converted into almost a dry lot. At this date about nine-tenths of the sorghum in Lot 2 remained standing, but all cowpea pods and green leaves were eaten.

METHOD OF CALCULATING PROFITS PER ACRE

According to Mumford and Weaver, to determine the profit per acre from any crop when grain is fed in addition it is necessary to first subtract from the total gain that which might be expected from dry lot feeding of the grain. In order to do this a pound of pork is accredited to each 5.6 pounds of grain.[2]

It was very noticeable that the 4 pigs in the dry lot did not gain as did the pigs in the cowpea-sorghum pasture supplemented with half the ration of pigs in the dry lot. The pigs in the dry lot did not eat as well as those in the pasture, and they were about to go off feed when the experiment was stopped.

The pigs on pasture, alone, did not gain satisfactorily. By looking over the table of growth it will be found that at the beginning of the experiment the pigs gained satisfactorily, but later on, when the pasture was nearly exhausted, they began to decrease in weight. If

[1] Iowa Bull. 136, (1913): 385.

[2] Missouri Agr. Exp. Sta. Bull. 110. (1913): 184.

plenty of pasture had been provided the pigs would probably have continued to make satisfactory gains.

The pigs on pasture with some concentrate gained 4 kilograms more than those in the dry lot, and 8 kilograms more than those in the pasture alone. Therefore, the cowpea-sorghum pasture with half the full ration of concentrate showed an efficiency of 40% over the dry lot, and 133.3% over the pasture alone.

Table III shows that cowpea sorghum pasture supplemented with half the ration of 3 parts rice bran and 7 parts of ground corn is very much better than a dry lot fed with the full ration of 3 parts rice bran and 7 parts of ground corn, and still much better than cowpea-sorghum pasture alone.

EXPERIMENT No. II

This experiment followed immediately Experiment No. I.

OBJECT OF THE EXPERIMENT

The object of this experiment was to determine the value of the remaining pasture of Lot 2, which was almost all sorghum, supplemented with enough concentrate, as compared with a full ration of concentrate alone and without any green feed whatever.

PLAN OF THE EXPERIMENT

The same pigs in Lot 1 and Lot 2 used in Experiment I were used in Experiment II. On June 2, 3, and 4 these pigs were weighed and the average weight found. After one week, for three successive days, they were weighed again. This experiment was closed after weighing the pigs on the morning of June 13.

DESCRIPTION OF THE PASTURE

At the beginning of this experiment there was about 9/10 of the sorghum in the pasture lot still standing. All cowpea pods and green leaves had been eaten in Experiment I. At the end of this experiment, the condition of the pasture was better than Lot 3 in Experiment I. There was about 1/10 of the sorghum still standing.

This experiment shows the value of a succulent pasture or a pasture which is grazed at the proper time. It also shows the importance of leaving the pigs in the pasture as long as there is anything to be grazed, and increasing the grain ration as the pasture becomes scarce.

The pigs in the pasture gained 1.1 kg. more than those in the dry lot. Therefore, the pasture lot gave 15.9% gain over the dry lot.

Since the same pigs, and the same pasture and same concentrate were used in Experiments I and II, then it is proper to combine the results of these two experiments in order to see the total difference between the gain of pigs on pasture alone and those in pasture with concentrates. The results are given in Table III:

TABLE III
EXPERIMENTS I AND II COMBINED

	Lot 1. 4 pigs. Dry Lot: 3 parts rice bran, 7 parts ground corn	*Lot 2. 4 pigs. Cowpea-sorghum pasture, and 1/2 as Lot 1*	*Lot 3. 4 pigs Cowpea-sorghum pasture alone*
Period covering May 19 to June 3 and to June 12..	24 days	24 days	15 days
Average initial weight.....	67.80 kg.	68.00 kg.	68.00 kg.
Average final weight.....	84.70 kg.	90.00 kg.	74.00 kg.
Total gain.....	16.90 kg.	22.00 kg.	6.00 kg.
Total amount of grain feed consumed.....	89.60 kg.	49.80 kg.	.....
Required grain feed to produce 100 kg. gain.....	530.20 kg.	226.30 kg.	.....
Cost of grain per 100 kg. gain.....	₱24.838	₱10.602	.....
Cost of grain per kilo gain.....	₱ 0.24838	₱0.10602	.....
Cost of grain saved by pasture per kilo gain.....	.....	₱0.14236	₱0.24838
Cost of grain saved by pasture for the whole gain...	.....	₱3.13192	₱1.49028
986 sq. m. of pasture made a direct saving of.....	.....	₱3.13192	₱1.49028
Saving from 1 Ha. (computed).....	.....	₱31.76	₱15.11
Grain accredited 0.0875 Ha.....	.....	66.83 kg.	31.81 kg.
Grain accredited per Ha. pasture.....	.....	763.86 kg.	363.54 kg.

The lot on pasture alone gained only 0.40 kg. per day or 0.10 kg. per pig, the dry lot gained 0.704 kg. per day or 0.176 kg. per pig, and the lot on pasture supplemented with concentrates gained 0.917 kg. per day or 0.229 kg. From these facts, pasture with ½ the full ration of concentrate showed an efficiency of 129.2% over pasture alone and 30.2% over the dry lot.

EXPERIMENT III

OBJECTS OF THE EXPERIMENT

The objects of this experiment were (1) to determine the value of cowpea pasture when supplemented with concentrate feed,[1] as compared with a full ration of concentrate alone, and (2) to determine the value of sorghum pasture when supplemented with concentrate, as compared with a full ration of concentrate alone.

PLAN OF THE EXPERIMENT

The same 12 pigs that were used in Experiments I and II were used also in this experiment. On the morning of June 14, 1917, these pigs were weighed and confined in the dry lot. They were weighed again on the two days following; their average weights were found, and then they were divided into three nearly equal lots by weight of four pigs each.

Lot No. 1, with a total average weight of 85.2 kilos, remained in the dry lot. This lot was given a full ration of concentrate but no green feed at all. Water and shade were provided.

Lot No. 2, with an average total weight of 84.2 kilos, was turned into a cowpea pasture, where it was given, during the first week, half the amount of concentrate that Lot No. 1 could consume in one day. This was increased later to a full ration as the forage became less plentiful. Water and shelter were supplied.

Lot No. 3, with an average total weight of 84.5 kilos, was turned into a sorghum pasture, and given, at first, half the daily ration of concentrate of Lot No. 1, but later the amount was increased as the pasture became more scarce.

DESCRIPTION OF THE PASTURE

Lot No. 2. The plot on which this lot was placed was planted April 7, 1917, with cowpeas set in rows and has an area of 875 square meters, approximately one-eleventh of a hectare. When the hogs were turned in, June 16, the cowpeas were full grown. Nearly half of their fruits were ripe. After one week pasturing all the pods and all the young green leaves were eaten up; and at the end of the experiment, July 7, 1917, the cowpeas were still standing, but had only branches and old green leaves. In some parts of the pasture the pigs had done some rooting.

Lot No. 3. The plot on which this lot was placed was planted on April 9, 1917, with a mixture of cowpea and sorghum seeds sown broadcast. But very few cowpeas grew, the cause of their failure being probably due to the sorghum being too thickly planted. Only a few cowpeas grew along the edge of the pasture. When the hogs were turned into this lot, the sorghums had an average height of about 60 centimeters and the few cowpeas were not yet beginning to bloom. The area of this lot is 875 square meters, approximately 1/11 hectare. At the end of the experiment, July 7, 1917, about 1/10 of the sorghum was left undisturbed. This was bearing fruit and was about 2.10 meters high.

[1] The concentrate here was the same as in Exp. I.

TABLE IV
EXPERIMENT II
GRAIN CONSUMED

Date 1917	Lot 1 Dry Lot Ground corn kg.	Lot 1 Dry Lot Rice bran kg.	Lot 1 Dry Lot Mixture kg.	Lot 2 Cowpea pasture Ground corn kg.	Lot 2 Cowpea pasture Rice bran kg.	Lot 2 Cowpea pasture Mixture kg.	Lot 3 Sorghum pasture Ground corn kg.	Lot 3 Sorghum pasture Rice bran kg.	Lot 3 Sorghum pasture Mixture kg.
June to 16 to June 23.....	24.94	10.68	35.6	12.46	5.34	17.8	12.46	5.34	17.8
June 23 to June 30.....	26.32	11.28	37.6	21.01	9.00	30.01	22.47	9.63	32.1
June 30 to July 7.....	27.44	11.76	39.2	27.44	11.76	39.2	20.56	8.82	29.4
TOTAL.....	78.68	33.72	112.4	60.91	26.10	87.01	55.51	23.79	79.3

	Lot 1 Dry lot. Full ration 3 parts rice bran 7 parts ground corn 4 pigs	Lot 2 Cowpea pasture plus 1/2 concentrate feed of Lot 1 4 pigs	Lot 3 Sorghum pasture plus 1/2 concentrate feed of Lot 1 4 pigs
Period covering: June 16 to July 7, 1917.....	22 days	22 days	22 days
Average initial weight of lot.....	85.2 kg.	84.2 kg.	84.5 kg.
Average final weight of lot.....	101.32 kg.	107.0 kg.	104.47 kg.
Total gain of lot.....	16.12 kg.	22.8 kg.	19.97 kg.
Total amount of grain feed consumed.....	112.4 kg.	87.01 kg.	79.3 kg.
Required grain feed to produce 100 kg. gain.....	697.27 kg.	361.62 kg.	397.095 kg.
Cost of grain per 100-kg. gain.....	₱35.91	₱17.71	₱20.45
Cost of grain per kilo of gain.....	₱0.3591	₱0.1771	₱0.2045
Cost of grain saved by pasture per kilo gain.....	.....	₱0.1820	₱0.1546
Cost of grain saved by pasture for the whole gain...	.....	₱4.1496	₱3.08736
875 sq. m. of pasture made a direct saving of.....	.....	₱4.1496	₱3.08736
1 Ha. of pasture made a saving of (computed).....	.....	₱46.14	₱35.28
Grains accredited pasture, 0.0875 Ha.....	.....	71.868	59.945
Grains accredited per Ha. pasture.....	.....	821.35	685.09

The pigs on cowpea pasture supplemented with ½ the full ration of concentrate gained 6.68 kg. more than those in the dry lot, and 10.83 kg. more than those in the sorghum pasture with ½ the full ration of concentrate. Therefore, cowpea pasture with ½ the full ration of concentrate showed an efficiency of 41.4% over the dry lot and 90.5% over the sorghum pasture with ½ the full ration of concentrate. Sorghum pasture with ½ the full ration of concentrate gave 34.7% less than the dry lot.

EXPERIMENT IV

OBJECT OF THE EXPERIMENT

The object of this experiment was to compare the feeding value of rice bran and shelled corn when both are supplemented with cowpea pasture.

PLAN OF THE EXPERIMENT

On Nov. 24, 1917, fourteen nearly uniform pigs were selected from the herd of the college. The seven younger ones were born on July 7, and the others seven on July 22, 1917. The fourteen were weighed and confined in two separate dry lots where they were given a gradually increasing amount of a mixture of equal parts of shelled corn and rice bran. They were weighed three times before being turned into the cowpea pastures.

Lot 1, having a total average weight of 85.4 kilos, was put in one of the cowpea pastures on December 8, 1917, and given at first, one-half and later the full standard daily ration for dry lots of shelled corn.[1]

[1] Henry and Morrison, Feeds and Feeding (1916): 569.

Lot 2, having a total average weight of 84.0 kilos, was put in the adjoining lot of cowpea pasture on December 8, 1917, where it was given at first one-half and later the full standard daily ration for dry lots of rice bran.[1]

These two lots were weighed the following week and, on December 18, were weighed again, as the pastures were becoming depleted. After weighing, the pigs were turned on their respective lots and the experiment was continued until the pasture became exhausted. Two successive daily weighings were made before closing this experiment.

DESCRIPTION OF THE PASTURES

Lot 1, having an area of 875 square meters, was planted with cowpeas on September 23. (The preparation of the soil and planting took one man one day and a half. At eighty centavos a day for the laborer and forty centavos for the bullock, the expense for plowing and planting was ₱1.80.) The cowpea was planted in rows about 60 centimeters apart and 60 centimeters in the row. This lot did not receive any cultivation on account of the prolonged rainy period, and as a result the lot became weedy.

Lot 2, having an area of 875 square meters, was planted on September 25 with cowpea and sorghum in alternate rows. (The expense for the preparation of the soil and planting was the same as for Lot 1.) The sorghum did not grow and so the distance between the rows was wider than that in Lot 1. Here the distance between the rows was 120 centimeters and 60 centimeters in the row. This lot became as weedy as Lot 1. The lot was estimated to have about ¾ the amount of cowpeas in Lot 1.

On the morning of November 26 one bullock was found inside each lot. These two bullocks were there during the night, grazing on the pasture. Great damage was done but approximately the damage was about the same in both lots.

On December 8 the pigs were put in the pasture. The cowpeas were succulent and bearing pods, about one-fourth of which were brown. After one week's pasturing the pigs had eaten up all the pods, and after three days more, *i. e.*, on December 18, even the young leaves of cowpeas were eaten up. The pigs were weighed on this date, preparatory to the closing of the experiment.

[1] Henry and Morrison, Feeds and Feeding (1916):569.

TABLE V

EXPERIMENT IV.—GRAIN CONSUMED

Date 1917-1918	*Lot 1 Shelled corn* Kilograms	Total kilograms	*Lot 2 Rice bran* Kilograms	Total kilograms
Dec. 8 to 14	19.30		17.40	
Dec. 15 to 17	13.30		12.80	
Total for 1st Period	.....	32.60	.....	30.20
Dec. 18 to 21	18.40		17.50	
Dec. 22 to 28	20.71		19.05	
Dec. 29 to Jan. 4	24.90		23.68	
Total for 2nd. Period	.....	64.01	.....	60.23
Total for 1st and 2nd. Period	.....	96.61	.....	90.43

FIRST PERIOD

	Lot 1 Cowpea pasture and Shelled corn 7 pigs	*Lot 2 Cowpea pasture and Rice bran 7 pigs*
Period covering Dec. 8 to 18, 1917	10 days.	10 days
Initial weight of the lot	85.40 kg.	84.00 kg.
Weight of the lot at the end of the Experiment	98.90 kg.	101.90 kg.
Total gain of lot	13.50 kg.	17.90 kg.
Total amount of grain feed consumed	32.60 kg.	30.20 kg.
Required grain feed to produce 100 kg. gain	241.47 kg.	168.99 kg.
Cost of grain to produce 100 kg. gain	₱11.186	₱8.124
Cost of grain to produce 1 kg. gain	₱0.11186	₱0.08124
Cost of grain fed for the whole gain	₱1.5101	₱1.45619
Grain accredited 0.0875 ha. pasture[1]	43.065 kg.	69.66 kg.
Grain accredited per ha. pasture[1]	492 20 kg.	796 20 kg.

[1] Missouri Agr. Ex. Sta. Bull. 110 (1913), Factor 5.6.

One hundred kilograms rice bran supplemented with cowpea pasture is equivalent to 142.8 kilograms of shelled corn supplemented with cowpea pasture. Therefore, rice bran with cowpea pasture showed an efficiency of 42.8% over corn with cowpea pasture.

SECOND PERIOD

	Lot 1 *Cowpea pasture*[1] *and Shelled corn* *7 pigs*	*Lot 2* *Cowpea pasture*[1] *and Rice bran* *7 pigs*
Period covering Dec. 18, 1917 to Jan. 5, 1918	18 days	18 days
Initial weight of the lot	98.9 kg.	101.9 kg.
Final weight	111.45 kg.	114.95 kg.
Total gain of lot	12.55 kg.	13.05 kg.
Total amount of grain feed consumed	64.01 kg.	60.23 kg.
Required grain feed to produce 100 kg. gain	510.00 kg.	461.50 kg.
Cost of grain per 100 kg. gain	₱23.642	₱22.187
Cost of grain per kilo of gain	₱0.23642	₱0.22187
Cost of grain fed for the whole gain	₱2.967	₱2.895
Grain accredited 0.0875 ha. pasture	6.27 kg.	12.85 kg.
Grain accredited per ha. pasture	71.67 kg.	146.86 kg.

[1] This pasture is the same one that was used in First Period

One hundred kilograms of rice bran with scanty cowpea pasture is equivalent to 110.5 kilograms of shelled corn with scanty cowpea pasture. Therefore, rice bran with scanty cowpea pasture showed an efficiency of 10.5% over corn with scanty cowpea pasture.

FIRST AND SECOND PERIODS

	Lot 1 *Cowpea pasture and Shelled corn* *7 pigs*	*Lot 2* *Cowpea pasture and Rice bran* *7 pigs*
Period covering Dec. 8, 1917 to Jan. 5, 1918	28 days	28 days
Initial weight of the lot	85.40 kg.	84.00 kg.
Weight of lot at end of experiment	111.45 kg.	114.95 kg.
Total gain of lot	26.05 kg.	30.95 kg.
Total amount of grain feed consumed	96.61 kg.	90.43 kg.
Required grain feed to produce 100 kg. gain	370.80 kg.	292.14 kg.
Cost of grain per 100 kg. gain	₱17.177	₱14.045
Cost of grain per kilo gain	₱0.17177	₱0.14045
Cost of grain fed for the whole gain	₱4.475	₱4.347
Grain accredited 0.0875 ha. pasture	49.27 kg.	82.94 kg.
Grain accredited per ha. pasture	563.09 kg.	947.88 kg.

One hundred kilograms of rice bran supplemented with cowpea pasture was found equivalent to 126.92 kilograms of shelled corn supplemented with cowpea pasture. Therefore, rice bran with cowpea pasture showed an efficiency of 26.92% over corn with cowpea pasture.

TABLE VI

For the purpose of comparison with American results the following table is given:[1]

Experiment	*Lot No.*	*Ration*	*Pounds gain per acre.*	*Pounds gain per acre.*	*Pounds[2] gain accredited forage*
I	2	½ ration of grain:— 3 parts rice bran. 7 parts ground corn. Cowpea-sorghum pasture.	126.4	225.7	86.1
	3	Cowpea-sorghum pasture alone.....	54.2	303.4	54.2
II	2	½ ration of grain:— 3 parts rice bran. 7 parts ground corn. Cowpea-sorghum pasture (remainder)	72.3	223.9	32.4
I and II	2	½ ration of grain:— 3 parts rice bran. 7 parts ground corn. Cowpea-sorghum pasture.	198.6	449.7	118.3
	3	Cowpea-sorghum pasture alone.....	54.2	303.5	54.2
III.	2	½ ration of grain:— 3 parts rice bran. 7 parts ground corn. Cowpea- pasture.	232.0	885.4	73.9
	3	½ ration of grain:— 3 parts rice bran. 7 parts ground corn. Sorghum pasture.	203.2	806.9	59.2
IV. 1st Period.	1	Shelled corn..... Cowpea pasture.	137.37	331.7	78.14
	2	Rice bran..... Cowpea pasture.	182.16	307.3	127.29
IV. 2nd Period	1	Shelled corn..... Cowpea pasture (remainder).	127.6	646.1	12.3
	2	Rice bran..... Cowpea pasture (remainder).	132.66	612.9	23.22
IV. 1st and 2nd Period	1	Shelled corn..... Cowpea pasture.	264.88	983.1	89.38
	2	Rice bran..... Cowpea pasture.	314.82	920.0	150.52

[1] In computing pounds gain accredited forage, the factor 5.6 was used.
[2] These figures were recalculated from the original tables as folows:
The "Pounds Gain per Acre" is obtained by reducing the total gain of the lot based on the actual extent of the pasture from the hectare to the acre basis, and from kilos to pounds.
The "Pounds Gain per Acre" is computed likewise, i. e., by reducing the kilos grain per hectare to pounds grain per acre.
The "Pounds Gain Accredited Forage" is obtained by subtracting the quotient obtained by dividing "Pounds Grain per Acre" by the factor 5.6 from "Pounds Gain per Acre."

The last column of this table gives the number of pounds gain accredited to forage. The same fact is given in the same column of Table 1. Comparing these two tables, one will see that some of the results presented in Table 6 are better than those found in Table 1, but no result, excepting the last one in Table 9, approached the average result presented on Table 1.

PART II

GROWING AND FATTENING PIGS IN THE DRY LOT

OBJECT OF THE EXPERIMENT

The object of the experiment was to determine the feeding value of shelled

corn, alone, compared with the feeding value of rice bran, alone.

PLAN OF THE EXPERIMENT

The same fourteen pigs used in Experiment IV were used in this experiment. These pigs were weighed for three successive days, January 19 to 21, 1918, and confined after the first weighing in two separate dry lots—Lot 1 and Lot 2—where Lot 1 was given shelled corn alone and Lot 2, rice bran. The amount of feed given in the morning and in the afternoon depended on the appetite of the pigs.

These two lots were weighed weekly and after weighing the pigs on the fiftieth and fifty-first days this experiment was closed.

These lots were provided with charcoal, ashes, salt, and water all the time.

TABLE VII
GRAIN CONSUMED

Date 1918	*Lot 1 kilogram*	*Lot 2 kilogram*
Jan. 19 to 25	29.50	28.20
Jan. 26 to Feb. 1	44.20	44.30
Feb. 2 to 8	38.60	34.10
Feb. 9 to 15	29.50	34.50
Feb. 16 to 22	26.00	19.60
Feb. 22 to Mar. 1	12.20	16.80
Mar. 2 to 10	6.30	14.10
TOTAL	186.30	191.60

At first the pigs in Lot 1 consumed 4.21 kilograms daily, or at the rate of about 0.60 kilogram each. This was increased to 0.91 kg. each the second week; after that, the appetite became poorer and their consumption of feed gradually decreased, until towards the end, the lot barely consumed 0.90 kilogram, or about 0.13 kilogram each. The pigs in Lot 2 had similar results, but their appetite kept up a little better than Lot 1 until the end of this experiment.

	Lot 1 Shelled corn 7 pigs	*Lot 2 Rice bran 7 pigs*
Period covering Jan. 19 to Mar. 10, 1918	51 days	51 days
Average initial weight of the lot	113.74 kg.	109.07 kg.
Average final weight of the lot	111.90 kg.	112.10 kg.
Total loss or gain of lot	—1.84 kg.	3.03 kg.
Total amount of grain feed consumed	186.30 kg.	191.60 kg.
Required grain feed to produce 100 kg. gain or loss	10125.00 kg.	6323.43 kg.
Cost of grain to produce 100 kg. gain or loss	₱469.03	₱304.01
Cost of grain to produce one kg. gain or loss	₱4.6903	₱3.0401
Cost of grain fed for the whole gain or loss	₱8.63	₱9.21
Value of pork produced or lost,		
75% dressed weight @ ₱0.40 per kilo	—₱0.552	₱0.909
@ ₱0.50 per kilo	—₱0.690	₱1.136
@ ₱0.60 per kilo	—₱0.828	₱1.364
Actual net loss, pork @ ₱0.40	₱9.182	₱8.301
@ ₱0.50	₱9.320	₱8.074
@ ₱0.60	₱9.458	₱7.846

It is evident from the results of this feeding test that shelled corn alone and rice bran alone did not give satisfactory financial returns. After 51 days' test Lot 1, fed with shelled corn alone, lost 1.84 kg., while Lot 2 fed with rice bran, gained 3.03 kg. With pork at ₱0.40 per kilo, Lot 1 lost 10.6% more than Lot 2; at ₱0.50 per kilo, it lost 15.4% more; and at ₱0.60 it lost 29.5% more.

Table VII shows that the pigs ate their feed voraciously at first and thus consumed a great amount of feed the second week, from then on, the amount decreased gradually. In proportion to the amount of feed consumed, these pigs gave the maximum increase in weight the second week and then gradually decreased until they lost in weight. These facts showed that the longer the feeding of shelled corn or rice bran, but especially corn, on these 16-kg. pigs, the greater the decrease of possible profit.

The table of growth[1] shows also that the decrease in weight is indirectly proportional to the average live weight of the pigs, that is, the smaller the weight of the pig, the greater the loss in weight per kilo of live weight. This coupled

[1] Omitted on account of length which, makes it impracticable for publication in this paper.—Editor.

with the fact observed that the young pigs did not eat their corn ration well showed that the younger the pigs the less nearly a perfect feed is shelled corn.

The appearance of the pigs at the end of this experiment showed that the pigs fed with rice bran were in better condition than those fed with shelled corn. The shelled-corn-fed pigs had thin hair and coarse coat, especially the younger ones which remained small and lean, with proportionally big heads, and prominent hip bones.

The results show that rice bran is more likely to maintain young pigs in the dry lot than shelled corn, and has a higher feeding value than shelled corn.

TABLE VIII
SUMMARY OF RESULTS
PART I

Experiment	*Lot No.*	*Ration*	*No. of pigs*	*Average initial weight of pigs kg.*	*No. of days*	*Total increase kg.*	*Av. daily gain per pig kg.*	*Kilo grain to produce 1 kg. gain*	*Cost of grain per 100 kg. gain*
I.	1	3 parts rice bran 7 parts ground corn...	4	16.95	15	10.0	0.16	5.000	23.424
	2	½ grain ration of Lot 1 plus cowpea-sorghum pasture.....	4	17.00	15	14.0	0.23	1.785	8.365
	3	Cowpea-sorghum pasture alone.....	4	17.00	15	6.0	0.10		
II	1	3 parts rice bran 7 parts ground corn...	4	19.45	9	6.9	0.19	5.739	26.88
	2	Same as Lot 1 plus remainder of cowpea-sorghum pasture....	4	20.50	9	8.0	0.22	4.950	14.51
I. and II. combined	1	3 parts rice bran 7 parts ground corn...	4	16.95	24	16.9	0.17	5.302	24.838
	2	½ grain ration of Lot I plus cowpea-sorghum pasture.....	4	17.00	24	22.0	0.23	2.263	10.602
	3	Cowpea-sorghum pasture alone.....	4	17.00	15	6.0	0.10		
III.	1	3 parts rice bran 7 parts ground corn...	4	21.30	22	16.12	0.18	6.972	35.91
	2	½ grain ration of Lot 1 plus cowpea-sorghum pasture.....	4	21.05	22	22.8	0.26	3.816	17.17
	3	½ grain ration of Lot 1 plus sorghum pasture.....	4	21.12	22	19.17	0.22	3.970	20.45
IV. 1st Period.	1	Shelled corn Cowpea pasture.....	7	12.20	10	13.50	0.19	2.414	11.186
	2	Rice bran Cowpea pasture.....	7	12.00	10	17.90	0.25	1.689	8.124
IV. 2nd Period.	1	Shelled corn and remainder of Cowpea pasture.....	7	14.13	18	12.55	0.09	5.100	23.642
	2	Rice bran and remainder of Cowpea pasture.....	7	14.56	18	13.05	0.10	4.615	22.187
IV. 1st and 2nd Period.	1	Shelled corn Cowpea pasture.....	7	12.20	28	26.05	0.13	3.708	17.177
	2	Rice bran..... Cowpea pasture.....	7	12.00	28	30.95	0.16	2.921	14.045

PART II

I.	1 Shelled corn.....	7	16.25	51	−1.84	−0.005	101.25	469.03
	2 Rice bran.....	7	15.58	51	3.03	0.008	63.234	304.01

SUMMARY

PART I

Table VIII shows that pastures supplemented with some concentrate gave the best results. The largest gain obtained from feed-grain alone was 0.19 of a kilo per head per day. When grain was fed with pasture the gains were markedly increased over those obtained where grain alone was fed. The largest gain obtained from feeding grain with pasture was 0.26 kilo per head per day. Pasture, alone, did not give as good results as concentrate, alone, in the dry lots.

Pigs on cowpea pasture supplemented with concentrate gained 0.26 kilo daily per head, while those in the sorghum pasture supplemented with the same concentrate gained only 0.22 kilo daily per head.

Pigs on cowpea pasture fed with rice bran gave the largest gain, 0.25 kilo daily per head, while those on cowpea pasture fed with shelled corn gained only 0.19 kilo daily per head.

PART II

Pigs fed with rice bran alone and corn alone gave satisfactory returns for a certain length of time, about two weeks, and after that time their gains began to decrease and finally they lost in weight. The pigs fed with rice bran gained in weight faster than those fed with shelled corn, and decreased in weight slower than those fed with shelled corn.

CONCLUSIONS

1. Young pigs can be raised cheaper when pastures are used along with concentrates than when grain alone or pasture alone is used.
2. Cowpea pasture supplemented with rice bran for growing pigs produces the cheapest pork.
3. Rice bran is a more efficient feed than shelled corn. This efficiency of rice bran over shelled corn is increased when pigs are put on cowpea pasture.
4. It is impracticable to raise growing pigs on a wide ration, like corn alone or rice bran alone.

ACKNOWLEDGMENT

Thanks are due to Assistant Professor B. M. Gonzalez for his valuable suggestions and criticisms during the progress of this work. I am also indebted to Bonifacio Navarrete, the swineherder of the college, for his help in carrying out the details of these experiments.

The Hog Industry of the Philippines with Special Attention to the Provinces around Manila [1]

By José Noguera y San Agustin

INTRODUCTION

In point of number, swine hold first place among the larger domesticated animals in the Philippines. There are over 2,000,000 (1) of these animals scattered throughout all parts of the Islands. The number of hogs produced annually, however, is totally inadequate to supply the country's demand. This is clearly shown by the fact that the annual importation of swine and swine products amounts to over ₱50,000, all of which products could easily be produced locally.

The investigation here reported was made in the provinces of Bataan, Pampanga, Bulacan, Rizal, Laguna, Batangas, Cavite, Tayabas, and the suburbs of Manila, which supply to a large extent the pork in the Manila market. These studies and the information obtained from students of the college from other parts of the Islands show that the swine industry in the Philippines is in a very unsatisfactory condition.

The conditions in the Philippines, however, are in some respects more favorable for hog raising than in many other countries, and offer exceptional inducement for the production of swine and possibly swine products.

Instead of importing such products, we must set ourselves to the task of growing more and better hogs. Except in some places around Manila and in other localities, which are but limited in number, good hogs are not raised. Our conditions are favorable from many standpoints, and there seems to be no reasonable excuse why the Philippines should not become one of the largest pork-producing countries per unit of area, if diligent and intelligent effort is given to the industry.

The object of the present work is to make a study of the hog industry in the Islands with special attention to the provinces around Manila. The conclusions reported in this paper are based chiefly upon information obtained from farmers in these regions. Trips were made to different municipalities in these provinces which are noted for their hog industry. Other trips were made to Manila and its suburbs where necessary data were collected for study. Other information was collected from sundry sources as a basis for this work.

TABLE I

THE IMPORTATION OF SWINE AND SWINE PRODUCTS INTO THE ISLANDS (2)

Year	*Kilos*	*Value*
1913	256,508	₱155,720
1914	81,384	59,504
1915	96,115	52,513
1916	72,583	72,583

THE NATIVE HOG

The native hog, as a rule, is long and narrow in conformation and has a long snout, long legs, and a weak back. Native hogs are usually very excitable and mature animals not fattened are generally vicious. The belly is pendant, this character being most noticeable in pregnant sows. Their predominating color throughout the Islands is black. They are voracious feeders and will lay on flesh fairly well.

The native swine are wonderfully hardy and prolific. The average number of pigs in a litter appears to be larger than in the case of improved breeds. A litter of twelve to fourteen is of rather common occurrence. The pigs are strong and the proportion that live is high. The sows are good mothers, rearing large litters well on very scanty feed.

[1] Thesis presented for graduation from the College of Agriculture, No. 96

The hogs usually serve as scavengers around the houses due to the fact that they are seldom, if ever, confined and are compelled to forage for their food most of the time. This method is contrary to the fundamental principles of successful hog raising and should be vigorously opposed by every municipal and health official, for sanitary reasons, if for no other. This practice makes the spread of various kinds of diseases easy and results in yearly losses of hogs and a consequent diminution of the pork supply.

THE "JALAJALA" HOGS

The so-called "Jalajala" hogs have long been famous as being among the best specimens of native swine. Specimens sold in the market known as Jalajala hogs seem to prove that this claim is not altogether without foundation. While on a visit to Jalajala in the province of Rizal, my attention was called to the comparatively strong back of the hogs there. They are larger and better than the common hogs. The ears are large and lopped towards the front. The head is shorter than the head of the common hogs. The back is fairly strong and broad, compared with the noticeably weak and narrow back of our common hogs. The ribs are fairly well sprung, and the sides are good. The body is fairly low set. It is claimed by the natives that they will fatten more readily than the common hogs. Wherever Jalajala hogs can be obtained, the natives prefer raising them to the ordinary hogs.

At present the hog industry of Jalajala is dead. Five years ago the streets of Jalajala were filled with hogs. They roamed the streets and ran around like dogs. They were a menace to the passers by, and children were sometimes attacked. A strict ordinance to keep them coralled was passed. Since then the people gave up raising hogs, so that at present very few are raised.

SELECTION OF THE BOAR

The smallest boar in the litter is usually the one kept for breeding, because he is practically useless for the market while the larger ones are castrated and raised for the market. The boars are allowed to run with the sows and, as a result, the sows are bred very early, before they have attained the proper breeding age.

SELECTION OF THE SOW

Some attention is given to the selection of the brood sow. A point that is usually considered is the number of teats, those with a large number being regarded superior. As to size and conformation no attention is given. The brood sow receives as little care as the rest of the herd.

AGE OF BREEDING YOUNG ANIMALS

It is a common practice by the natives to pay practically no attention to the coming brood sow. The sows are usually bred as early as they will take the boar and as a result they are bred too young. This tendency to put the females to work too early in life is probably partly responsible for the small size of the pigs and their subsequent slow and unsatisfactory growth, and the small type of hogs usually raised.

THE PIGS

Native swine are very prolific. A litter of twelve pigs is of common occurrence. The brood sows are fed with the same feed as the rest of the herd. They do not receive proper care and are usually underfed. The pigs suckle the mother heavily and as a result it is very hard to bring the mother back into condition.

In the majority of cases in the Islands, the pigs are allowed to run with the mother until they become self-weaned. By this practice a small number of litters is being raised. Many pigs are stunted for lack of care during the first month after weaning. They are turned out to forage for themselves. The native system of feeding young pigs with the larger ones is a decided disadvantage to the young pigs.

FEEDING AND MANAGEMENT

Our people who do not make a specialty of the swine business make no distinction between the feeding and management of the breeding hogs and of the market hogs.

The kinds of feed are not varied to any extent. What is found locally is given and fed. Rice bran forms the chief feed in rice-growing regions. When corn is plentiful, this is given chiefly. Corn is given as ear corn or shelled. When shelled, it is sometimes soaked in water. Coconut-meal, or "paliat," pongapong (*Amorphophallus campanulatus*), cassaua, kiapo (*Pistia stratiotes*) and other feeds found locally are given when available. Low grade rice is given occasionally. The hogs are usually fed morning and afternoon and allowed to forage during the rest of the day. They are fed from a wooden trough called "labangan".

Although it is not a general practice to cook the feed for swine, banana stalks and pongapong are cooked before being fed. Banana stalks, preferably of the saba or butuan variety, are chiefly used. The outer sheaths are first removed and the center sliced with a knife. The chopped pieces are pounded in a rice mortar and then boiled. Darac or rice bran is added while boiling and as a result a pasty feed is obtained. Pork from hogs fed chiefly with banana stalks has hard fat. Consumers can recognize such pork and generally pay a lower price for it.

In coconut regions, hog raising is confined especially to places near native oil mills. The hogs are mainly fed with "paliat" or coconut-meal. This meal is kept in large baskets and generally becomes rancid before it can be fed. While on a trip to Lilio, Laguna province, my attention was called to a litter of five pigs that were fed exclusively with coconut-meal. They were penned and had no chance to forage. They appeared badly stunted and inactive. Although they were better fleshed, they appeared less healthy than pigs that are allowed to forage by themselves.

It is a common practice with our people who raise hogs to feed them with kitchen refuse, whenever available. In the suburbs of Manila where modern hog raising is maintained, the garbage from hotels and restaurants is used to advantage. Some breeders keeping pure-bred hogs around Manila feed their hogs almost exclusively upon this. Such garbage consists chiefly of scraps of bread and meat. It is collected daily by the owner and hauled in cylindrical cans with covers. The feed is fresh and clean. This table refuse is obtained free of charge by an agreement with the hotel or by paying ₱15.00 per month for each can taken daily.

To give an idea of the native method of feeding, Table II is presented from data collected from different farmers while on my trips to different provinces.

TABLE II. NATIVE METHODS OF FEEDING

Place	*No. of hogs.*	*Approx. weight of lot*	*Kind of feed*	*Amt. of feed*	*Regularity of feeding*
Guagua, Pampanga.	3	145 kg.	Rice bran.....	1.2 kg.	Morning and afternoon
Malabon, Cavite...	8	280 "	Rice bran.....	3.25 "	" " "
Orani, Bataan.....	5	190 "	Rice bran.....	1.95 "	" " "
Manila.....	30	1200 "	Copra meal (*a*).....	6.16 "	" " "
Magdalena, Laguna.	7	280 "	Paliat.....	1.85 "	Morning
Magdalena, Laguna.	4	200 "	Paliat.....	1.12 "	"
Calumpit, Bulacan..	4	184 "	Rice bran with middlings(*b*)	1.06 "	Morning and afternoon
San Roque, Cavite..	2	84 "	Rice (low grade) (*c*).....	1.7 "	" " "

"Paliat" is the coconut-meal obtained from native oil presses.

"Pongapong," *Amorphophallus campanulatus.*

Cassava, or camoteng cahoy, *Manihot utilissima.*

"Kiapo," *Pistia stratiotes.*

(*a*) 6.16 kilos of copra meal diluted with 70 liters of water. From this mixture one liter is given for each hog, morning and afternoon. In addition a cylindrical can (3 ft. high by 1 ft. in diameter) of kitchen refuse is given.

(*b*) Rice bran with rice middling in the proportion of 5:1. This mixture is boiled before being fed.

(*c*) Low grade rice boiled before feeding.

CASTRATION

Castration of pigs is commonly practised among the people. It is a comparatively simple operation. All young boars not intended for breeding are castrated. They are castrated when between three to six weeks old. Two slits are made at the end of the scrotum and the testicles are removed by forcing them out and cutting off the spermatic cord. In many cases no antiseptic is used. Sometimes they are bled after the operation by squeezing the blood out, as in milking. The wound is left alone to heal. Others, however, fill the scrotum with a mixture of wood ash, coconut oil, and common salt.

SPAYING

Spaying is very rarely done. The writer has not met anybody in his various trips who knew how to spay properly. The sow operated upon is usually about four months old, or before she comes into heat. A cut is made in the right side of the belly big enough to let in the thumb and the first finger. The fingers are inserted and a search is made for the ovaries. The ovaries are removed by carefully pulling them out and cutting them. A cord is tied around the end and the opening is sewed.

In some parts of Pampanga, Bataan, and Cavite a system is practised by which the sows are made barren. Two or three cylindrical pieces of lead, 8 cm. long and 1½ cm. in diameter, and previously dull-pointed and oiled are inserted into the uterus through the vulva. The sow is held upside down and the hips are tapped to ease the entrance of the pieces of lead, which are inserted as far as possible. The sows never come into heat after this treatment and as a result they never produce young. They fatten readily.

MARKET CONDITIONS

There is always a good market for hogs in all parts of the Islands, both for local consumption and for shipment to the larger towns or cities. Hogs supply the local meat demand to a large extent. When young, they are sold as "fancies". Many pigs before six months old are slaughtered as "lechones". They are fattened rapidly, and are prepared for the table stuffed and roasted whole over live charcoals. Pigs for this purpose bring excellent prices. Where hogs are exported to larger towns, they are marketed when matured, for there is hardly any attempt to fatten them before they are matured. But due to the high or increased cost of feeds, hogs are exported at present when still too young. This condition is evident in Table III, the figures for which were obtained from the Manila Matadero. Hogs are shipped to Manila either by rail or boat.

The prices for pigs are set by estimates. There are few factors which influence the price. The barrows tend to command higher prices than the females. Condition and size are chief factors influencing the price, at a given condition of the market.

Usually a man buys the pigs around the town and takes them to the market. He sells them to the retailer, who is usually a butcher. A good gain is made by this man. Some are sold at prices as high as ₱60.00 a head, but ₱30.00 is a commoner price in normal times. These buyers usually make as much as ₱10.00 per head.

THE MANILA MATADERO

All hogs, cattle, sheep, and goats intended for the Manila market are killed in the slaughtering house or matadero. This matadero is well equipped and with competent meat inspectors for the inspection of the meat before being sold to the people. This matadero is maintained by the city. Five centavos per kilo of hogs live weight, is charged for the use of the place and inspection. The animals killed and inspected are recorded. Table III gives data on the slaughtering of hogs in this matadero.

TABLE III. NUMBER OF HOGS SLAUGHTERED IN THE MANILA MATADERO FROM JANUARY, 1916, TO MARCH, 1918, INCLUSIVE.

Year	*Month*	*No. of hogs killed*	*Live weight in kilos*	*Average weight in kilos*	*No. of hogs condemned*	*Per cent condemned*
1916	Jan.	7050	381,749	54.15	140	1.98
	Feb.	6782	345,311	50.91	121	1.8
	Mar.	8155	380,868	46.7	136	1.67
	April.	7003	396,871	56.7	130	1.85
	May.	7698	412,926	53.64	155	2.01
	June.	7270	400,697	55.12	141	1.93
	July.	7845	431,040	54.96	178	2.27
	Aug.	8298	444,906	54.7	176	2.12
	Sept.	8121	411,728	50.7	154	1.9
	Oct.	8253	410,957	49.8	121	1.58
	Nov.	7379	394,862	53.52	150	2.03
	Dec.	8578	428,080	50.	143	1.8
1917	Jan.	7861	378,006	48.08	120	1.6
	Feb.	7530	352,254	46.79	122	1.61
	Mar.	8201	383,963	46.82	104	1.26
	April.	7906	382,843	49.69	127	1.61
	May.	9189	422,908	42.02	152	1.65
	June.	8807	419,538	47.63	139	1.57
	July.	9333	436,200	47.80	144	1.54
	Aug.	9308	510,203	54.81	105	1.13
	Sept.	9530	396,238	41.57	111	1.16
	Oct.	9299	387,163	41.20	90	.96
	Nov.	8686	361,879	41.64	82	.95
	Dec.	8939	386,669	43.25	86	.95
1918	Jan.	8978	385,106	42.89	107	1.19
	Feb.	8258	382,487	46.31	83	1.00
	Mar.	8734	382,377	41.49	73	.83

This table shows that the average live weights range from 41.2 to 54.15 kilos. While there is a considerable increase in the number of hogs slaughtered during the period shown, yet there is a well marked decrease in their live weights. This decrease in weight is without doubt due to the increased cost of feeds and the resulting increase in the cost of maintenance. The people are beginning to give up the idea of marketing their hogs when matured. The above table also shows a decrease in the number condemned. This is probably due to the fact that hogs killed at a younger age are not yet so seriously affected with parasitic diseases as are the older ones.

PREPARATION FOR THE MARKET

The hogs are kept as quiet as possible before slaughtering. With the aid of an assistant the animal is seized and the legs are tied together. The animal is

turned on its back and with a long bladed sharp knife a cut is made through the skin lengthwise and the knife forced downward and backward in the central line of the body until the heart is pierced or the main artery leading to the heart is severed. The blood spurts out in a stream and death quickly follows. The blood is collected in petroleum cans to be sold for food.

After bleeding, the pigs are dipped into the vat of hot water and turned occasionally. After a short while the hairs loosen and slip off easily. The bristles are then thoroughly removed from the body with sharp knives. The animals are then washed with cool water and scraped again. They are then laid in rows and examined for cysts. A cut is made along the face and the cut pressed open. If cysts are found, the animal is condemned. The internal organs are removed and inspected for diseases and are wholly or partly condemned, according to the kind and extent of the disease.

The animals are hung with the head downward and checked before they are sent to the market. They are left hanging for a while to enable further bleeding to take place. This operation is said to increase the keeping quality of the meat.

INTRODUCTION OF PURE-BRED HOGS FOR THE IMPROVEMENT OF THE NATIVE SWINE

The importation of pure-bred hogs for the improvement of the native swine has been carried by the Bureau of Agriculture during the past few years. The Bureau of Agriculture began furnishing pure-bred boars, either by loan or sale, to the different provinces. Since then the demand for pure-bred hogs has continued.

A number of pure-bred hogs, such as the Berkshire, Duroc Jersey, Tamworth, and Yorkshire, have been imported from time to time for the improvement of the native stock. To meet the increasing demand for pure-bred hogs, the Bureau of Agriculture maintains pure-bred hogs in the provinces for public service. One of the drawbacks for pure-bred hogs in the islands is their susceptibility to diseases, especially kidney worms.

Of all the imported pure-bred hogs in the Islands the Berkshire has proven to be best adapted for the improvement of the native stock. Berkshire-native crosses are in some cases hard to distinguish from the pure-bred stock. They are shorter, broader, and with stronger backs than the native hogs. The grades are exceedingly satisfactory and equal the pure-bred as market hogs. Wherever pure-bred boars are maintained, the natives bring their sows to breed to them. This materially improves the quality of the hogs produced.

Aside from the Bureau of Agriculture, private persons around Manila and in other places keep breeding hogs, especially the Berkshires. A good profit is made by these persons from this business. The demand for pure-bred hogs is increasing and the present supply is still inadequate.

SUMMARY

1. There are over 2,000,000 hogs in the Islands.

2. The pork supply is inadequate and the importation amounts to over ₱50,000 annually.

3. Philippine swine industry offers a very wide field for improvement.

4. The native hog has very poor conformation but is remarkably hardy and prolific.

5. The hogs are compelled to forage for most of their feed and are made the scavengers of the country.

6. The smallest boar in the litter is usually the one kept for breeding pur-

poses. The breeding boar is allowed to run with the sows all the time.

7. Some attention is given to the selection of the brood sows, but they are allowed to breed very early. Brood sows do not receive the care and do not get the feed they should.

8. The pigs are self-weaned and are stunted for lack of care after weaning.

9. Growing, breeding, and feeding hogs are kept together in one herd.

10. The feed for hogs depends largely upon the local supply. They are usually fed twice a day.

11. Castration of hogs is common, while spaying is very rarely done. The barrows command higher prices than the females.

12. The figures from the Manila Matadero show a recent decrease in the weight of the hogs killed from 54.15 to 41.2 kilos.

The per cent of condemned has also decreased.

13. Improvement of the native swine is being carried largely by the Bureau of Agriculture.

RECOMMENDATIONS

1. Swine raising should be made the leading live stock industry of the Philippines inasmuch as hogs are economical feeders, can subsist largely on by-products of local industries, and find a ready market even in small communities.

2. The native hogs should be given better care, better feeding and management and better quarters than they commonly receive.

3. Selection of the breeding animals must be made from the best specimens of the stock.

4. Hogs must be coralled for the prevention of diseases.

5. Systematic breeding towards the improvement of the native swine by the use of pure-bred hogs, especially Berkshires should be carried on.

ACKNOWLEDGMENT

The writer desires to express his thanks to Assistant Professor B. M. Gonzalez for his suggestions and criticisms during the course of this work.

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Weather Observations, August, 1918

Observer—V. Ravara

Date	Rainfall in mm. Daily	Rainfall in mm. Weekly	Temperature in °C Min-imum	Temperature in °C Max-imum	Temperature in °C Mean Daily	Temperature in °C Mean Weekly	Wind in miles Daily	Wind in miles Weekly	Cloudiness	Atmometer Reading in cc. Evaporation Daily	Atmometer Reading in cc. Evaporation Weekly	Atmometer Reading in cc. Insolation Daily	Atmometer Reading in cc. Insolation Weekly
July													
28	19.3		24.8	23.1	23.9		34.1		cloudy	4.7		1.10	
29	7.5		28.6	23.0	25.8		23.1		"	17.9		2.20	
30	0.1		30.0	25.6	27.8		62.0		¾ "	25.4		2.00	
31	0		30.5	25.6	28.0		39.4		½ "	36.7		4.30	
August													
1	37.6		31.1	21.8	26.4		61.0		cloudy	28.4		4.0	
2	0.5		30.6	22.6	26.6		23.0		¾ "	17.6		15.0	
3	T	65.0	29.1	22.6	25.8	26.3	24.3	266.9	½ "	20.5	151.2	12.1	40.7
4	0		31.2	22.0	26.6		37.9		½ "	33.2		0.4	
5	0		30.8	22.8	26.6		55.3		½ "	31.0		16.0	
6	0		31.2	22.7	26.9		66.9		clear	34.7		16.1	
7	0		31.2	22.7	26.9		46.6		"	30.9		15.5	
8	0		30.0	23.0	26.5		22.2		"	20.1		12.5	
9	14.9		27.9	23.9	25.9		19.1		cloudy	9.6		7.0	
10	25.6	40.5	26.5	22.7	24.6	26.3	9.2	257.2	"	6.8	166.3	4.9	72.4
11	22.5		24.5	22.2	23.3		12.9		"	2.6		.7	
12	14.9		25.9	22.6	24.2		27.6		"	8.5		3.8	
13	11.2		24.6	22.8	23.7		49.6		"	5.9		1.7	
14	5.7		28.6	23.5	26.0		49.4		"	22.0		8.1	
15	0.6		27.4	21.9	24.6		24.5		"	16.9		10.2	
16	1.0		29.0	23.2	26.1		14.5		½ "	17.4		8.4	
17	5.5	61.4	28.4	23.6	26.0	24.8	17.5	196.0	"	13.9	87.2	7.4	40.3
18	15.4		28.0	23.6	25.8		37.5		¾ "	17.8		14.2	
19	T		28.8	23.6	26.2		43.2		partly cloudy	24.0		7.2	
20	25.4		27.0	23.6	25.3		18.9		cloudy	12.8		6.2	
21	5.0		27.5	22.8	25.1		17.8		"	9.6		6.5	
22	8.5		28.8	23.0	25.9		32.1		"	19.9		7.6	
23	23.2		26.1	22.7	24.4		16.8		"	5.5		3.9	
24	0.7	78.2	29.0	22.9	25.9	25.5	27.7	194.0	fair	19.0	108.5	8.7	54.3
25	0		30	24.4	27.2		28.5		½ fair	27.4		12.2	
26	10.4		28.0	24.0	26.0		29.0		½ cloudy	19.1		2.4	
27	1.2		26.6	22.8	24.7		11.6		cloudy	8.4		5.5	
28	7.2		26.6	23.1	24.8		11.4		"	4.4		3.3	
29	5.3		30.0	23.1	26.5		33.8		"	28.4		9.8	
30	1.6		29.0	23.2	26.1		22.6		¾ "	22.2		5.8	
31	0.6	26.3	27.9	22.6	25.2	25.8	23.0	159.9	¾ "	19.4	129.3	1.7	40.7
Month		244.5				25.7		915.4			557.8		238.8

College Coffee Plantation

28–3	18.5	29.4	20.1	24.7
4–10	39.7	29.4	21.0	25.2
11–17	96.0	27.8	19.8	23.8
18–24	89.0	28.5	20.5	24.5
25–31	36.5	28.0	20.4	24.2

Summit of Mt. Maquiling

28–3	58.4	21.1	17.7	19.4
4–10	27.2	21.1	17.6	19.3
11–17	89.0	18.8	17.6	18.7
18–24	104.0	19.7	18.3	19.0
25–31	52.0	21.0	18.6	19.8

The month of August was quite rainy, with little wind and low evaporation, but the mornings being usually sunny, the total insolation was high for the month.

Forman T. McLean
Associate Professor of Plant Physiology.

COLLEGE AND ALUMNI NOTES

Bienvenido María Gonzalez, B. Agr., (U. P., 1913) and M. S., (Wisconsin, 1915), Assistant Professor of Animal Husbandry of this college, has been elected alumnus member of the Board of Regents of the university by an overwhelming majority.

Several changes and additions have been made in the staff of THE PHILIPPINE AGRICULTURIST. A Board of Control has been created, which shall be responsible for the policy of the paper as an official publication of the College of Agriculture. The board, as now constituted, is composed of Acting Dean C. F. Baker, Associate Professor F. T. McLean, and Assistant Professors B. M. Gonzalez, M. L. Roxas and S. F. Trelease. The property officer of the college has been made auditor of the paper, *ex-officio*. Mr. Toribio Vibar, Instructor in Agronomy, and Mr. Primitivo Ramos, Assistant in Chemistry, have been appointed assistant business managers, relieving Mr. Antonio Chanco.

Preparations for the Fourth Annual Exposition of the College of Agriculture are now well under way. The different departments are having their very busy days in their efforts to vie with each other in the production of instructive and interesting agricultural exhibits.

Assistant Professors M. L. Roxas and B. M. Gonzalez, and Dr. N. B. Mendiola have been named to take charge of the lunch for visitors during the exposition days.

Dr. Andrés Navarro, '12, of this college, and a 1918 graduate of the College of Medicine and Surgery, is now a commissioned officer in the medical department of the Philippine Constabulary.

Military drill has been resumed at the College of Agriculture, and participation in these exercises is required of all first- and second-year students. By a special arrangement with the authorities of Camp Eldridge, First Sergeant Victoriano J. Estevanez, Sergeant Mauricio B. Jaberina and Corporal Sancho Escueta, of the Philippine Scouts, are serving as instructors in the drill.

For the purpose of establishing a uniform system of treatment for delinquent students, scholarship rules have been approved by the faculty at its last meeting.

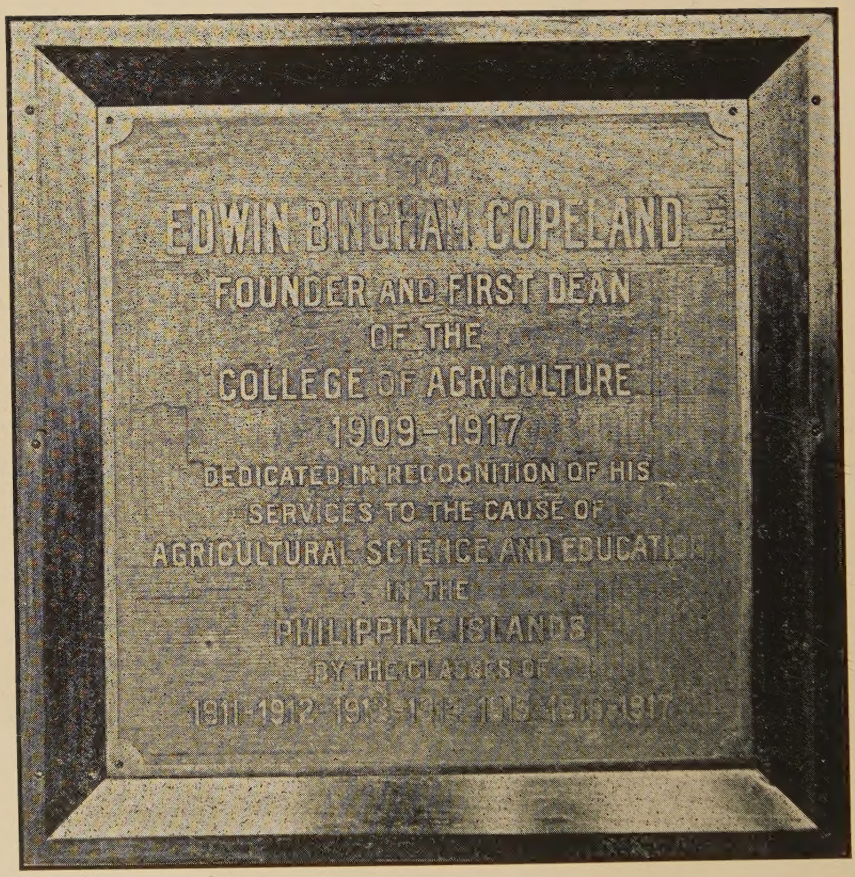
On account of extremely poor scholarship records, seven students have been suspended for the rest of the college year and a number of others are on probation, which means that if they do not show marked improvement in their grades within two months, they will also be placed on the suspension list.

Mr. Toribio Vibar, Instructor in Agronomy, has recently been appointed assistant to the registrar in addition to his other duties.

Mr. Leopoldo B. Uichanco, Instructor in Entomology of the College and Editor-in-Chief of this paper, has been confined in the hospital for a number of days on account of illness.

Mr. Francisco D. Marquez, '15, visited the College of Agriculture recently to confer with the college authorities in connection with the proposed corn breeding program of the Bureau of Agriculture at La Carlota Experiment Station, where Mr. Marquez is expected to be placed in charge soon.

Mr. Merino's leg which was reported as lost as a result of a motorcycle accident has been saved and is still a part of Mr. Merino, thanks to the masterly surgical skill of Dr. Potenciano Guazon. Mr. Merino lost only the middle portion of the left fibula, but it is expected that, in spite of the loss, he will still be able to use that leg on recovery. He is now confined to Unit 3, Room 357, Philippine General Hospital.



BRONZE TABLET ERECTED AT THE COLLEGE OF AGRICULTURE IN HONOR OF PROFESSOR EDWIN BINGHAM COPELAND.